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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/016,661

10/29/2001

Remis Balaniuk

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EXAMINER

GEBRESILASSIE, KIBROM K

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 07/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/016,661	Applicant(s) BALANIUK ET AL.	
	Examiner Kibrom K. Gebresilassie	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 13-35 is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is responsive to the amended application filed on April 28, 2006.
2. Claims 1-35 are examined.

Response to Arguments

3. Applicants arguments filed on April 28, 2006 have been fully considered.

Regarding Applicants response to 103 rejection: Applicant's arguments with respect to claims 1-35 have been fully considered and are persuasive. The rejection of 103(a) has been withdrawn.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the model definition module, simulation module, rendering module, network environment, personal computer, portable devices, and surgical interfaces must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claim 13 is objected to because of the following informalities: "n" should be replaced with "b". Appropriate correction is required.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. **Claims 1, and 10 are rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter.**

Per independent claims 1 and 10: The Examiner first submits that, in view of the language of the claims, method claim 1, and 10 are abstract and do not appear to recite a tangible result. In this case the result appears to merely be an abstract set of system elements that are not used to achieve the application recited in the preamble of the claim. The examiner submits that in order to establish a practical application, there must be either a physical transformation, or a useful, concrete and tangible result. Data

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transformation is not the same as a physical transformation. In this instance, it does not appear to be a tangible result. Here, the recited system elements simply result in constructing, and meshing, and are not a physical transformation. The claimed elements in this case, are simply a thought or computation element, and not in themselves a tangible result. It is not until the transformation applied in a meaningful way that it has real world value and becomes a tangible result.

MPEP 2106 recites the following:

"A. Identify and Understand Any Practical Application Asserted for the Invention. The claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." State Street, 149 F.3d at 1373, 47 USPQ2d at 1601-02. The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research (Brenner v. Manson, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96); In re Ziegler, 992, F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993)). Accordingly, a complete disclosure should contain some indication of the practical application for the claimed invention, i.e., why the applicant believes the claimed invention is useful.

Apart from the utility requirement of 35 U.S.C. 101, usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. See Arrhythmia, 958 F.2d at 1057, 22 USPQ2d at 1036. Merely claiming nonfunctional descriptive material stored in a computer- readable medium does not make the invention eligible for patenting. For example, a claim directed to a word processing file stored on a disk may satisfy the utility requirement of 35 U.S.C. 101 since the information stored may have some "real world" value. However, the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole must produce a "useful, concrete and tangible" result to have a practical application.

Although the courts have yet to define the terms useful, concrete, and tangible in the context of the practical application requirement for purposes of these guidelines, the following examples illustrate claimed inventions that have a practical application because they produce useful, concrete, and tangible result:

- Claims drawn to a long-distance telephone billing process containing mathematical algorithms were held to be directed to patentable subject matter because "the claimed process applies the Boolean principle to produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle." AT & T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999);*
- "[T]ransformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces a useful, concrete and tangible result' -- a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades." State Street, 149 F.3d at 1373, 47 USPQ2d at 1601; and*
- Claims drawn to a rasterizer for converting discrete waveform data samples into anti- aliased pixel illumination intensity data to be displayed on a display means were held to be directed to patentable subject matter since the claims defined "a specific machine to produce a useful,*

concrete, and **tangible result**." *In re Alappat*, 33 F.3d 1526, 1544, 31 USPQ2d 1545, 1557 (Fed. Cir. 1994)."

Any dependent claims inherit the defects of the claims from which they depend.

Allowable Subject Matter

3. Claims 13-35 are allowed over the prior art of record.
4. The following is an examiner's statement of reasons for allowance:

Applicants are disclosing a method and system for real time modeling of deformable objects filled with fluid, comprising means for simulating elastic deformation of deformable objects, and simulating deformable objects in at least two different dimensional spaces. This has been disclosed in the prior art of record.

While these elements are individually disclosed in the prior art, the prior art of record does not meet the conditions as suggested in MPEP section 2132, namely:

"The identical invention must be shown in as complete detail as is contained in the ... claim."

Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The elements must be arranged as required by the claim, but this is not an ***ipsissimis verbis*** test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

In this case the prior art of record does not disclose the specific combination of system elements or sequence of method steps as now recited in independent claim 13, 21, and 25. In particular, the examiner notes that while features such as simulating elastic deformation of deformable objects, and simulating deformable objects in at least two different dimensional spaces are known and operationally part of deformable object modeling. These features are not explicitly disclosed or rendered obvious as being **in combination with the discertising volume of said deformable objects with a plurality of**

long elements wherein number of said plurality of long elements is proportional to b^2
where b is length of a side of said deformable object as now recited in independent
claims 1, 15, and 24.

5. The prior arts recited by an examiner:

- a. "Adaptive Nonlinear Finite Elements for Deformable Body Simulation Using Dynamic Progressive Meshes" by X. Wu, M. S. Downes, T. Goktekin, and F. Tendick, herein referred as **Wu**: discloses an adaptive refinement scheme optimized for simulation with nonlinear FEM (Finite Element Method). However, Wu does not explicitly disclose discertising volume of said deformable objects with a plurality of long elements wherein number of said plurality of long elements is proportional to b^2 where b is length of a side of said deformable object as now recited in independent claims 13, 21, and 25.
- b. "Preliminary Finite Element Analysis with SAGE" herein referred as **PFEAS**: teaches to simulate axisymmetric drained compression, axisymmetric undrain compression, one-dimensional consolidation, isotropic consolidation, and plane strain compression and further verifying the finite element analysis with other numerical or analytical methods. However, PFEAS does not explicitly disclose discertising volume of said deformable objects with a plurality of long elements wherein number of said plurality of long elements is proportional to b^2 where b is length of a side of said deformable object as now recited in independent claims 13, 21, and 25.

- c. "Volumetric Object Modeling for Surgical Simulation" by S. Gibson, C. Fyock, E. Grimson, T. Kanade, R. Kikinis, H. Lauer, N. McKenzie, A. Mor, S. Nakajima, H. Ohkami, R. Osborne, J. Samosky, and A. Sawada herein referred as Gibson: teaches to use a volumetric models of the knee derived from 3D Magnetic Resonance Imaging, visual feedback via real-time volume and polygon rendering, and haptic feedback provided by a force feedback devices. However, Gibson does not explicitly disclose discertising volume of said deformable objects with a plurality of long elements wherein number of said plurality of long elements is proportional to b^2 where b is length of a side of said deformable object as now recited in independent claims 13, 21, and 25.
- d. US Patent No. 6,259,453 issued to Itoh: teaches to provide a meshing method for automatically generating a quadratic mesh method having less distortion, but again does not explicitly disclose discertising volume of said deformable objects with a plurality of long elements wherein number of said plurality of long elements is proportional to b^2 where b is length of a side of said deformable object as now recited in independent claims 13, 21, and 25.

The features noted above relating to the specific combination of elements and sequence of method steps renders the claimed invention non-obvious over the prior art of record. Dependent claims 14-20, 22-24, and 26-35 are deemed allowable as depending from independent claims 13, 21, and 25 respectively.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably


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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. Claims 1-12 are rejected.
7. Claims 13-35 are allowed.
8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
9. Any inquiring concerning this communication or earlier communication from the examiner should be directed to Kibrom K. Gebresilassie whose telephone number is (571) 272-8571. The examiner can normally be reached on Monday-Friday, 8:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner supervisor, Kamini shah can be reached at (571) 272-2279. The official fax number is (571) 273-8300. Any inquiring of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is (571) 272-3700.

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